

Down will come baby, cradle and all: diagnostic and therapeutic implications of chronic trauma on child development

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Objective: This review examines the clinical outcomes associated with exposure to chronic intrafamilial trauma and explores the treatment of the psychological, biological and cognitive sequelae.

Method: The existing research literature on the subject was collected, using *Index Medicus/MEDLINE*, *Psychological Abstracts* and the PILOTS database. The research findings were supplemented with clinical observations by the authors and other clinical writings on this topic.

Results: Children with histories of exposure to multiple traumatic experiences within their families or in medical settings usually meet criteria for numerous clinical diagnoses, none of which capture the complexity of their biological, emotional and cognitive problems. These are expressed in a multitude of psychological, cognitive, somatic and behavioural problems, ranging from learning disabilities to aggression against self and others.

Conclusions: Exposure to intrafamilial violence and other chronic trauma results in pervasive psychological and biological deficits. Treatment needs to address issues of safety, stabilise impulsive aggression against self and others, promote mastery experiences, compensate for specific developmental deficits, and judiciously process both the traumatic memories and trauma-related expectations.

Key words: aggression, attachment, child abuse, dissociation, trauma.

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Given the enormous scope of the problem, scant attention has been paid to the consequences of chronic child maltreatment, such as neglect and physical or sexual abuse. Isolated traumatic incidents tend to produce discrete conditioned behavioural and biological responses to reminders of the trauma. In contrast, chronic maltreatment or medical traumatization, such as occurs in children who are exposed to

repeated surgical procedures, have pervasive effects on development. Chronic childhood trauma interferes with the capacity to integrate sensory, emotional and cognitive information into a cohesive whole and sets the stage for unfocused and irrelevant responses to subsequent stress. When trauma occurs in the presence of a supportive, if helpless, caregiver, the child's response will largely mimic that of the parent: the more disorganised the parent, the more disorganised the child [1,2]; the security of the attachment bond mitigates against trauma-induced terror. In the long term abuse, neglect and exposure to multiple surgical procedures have much more pervasive effects than single incident traumas. The resulting spectrum of biological, emotional and cognitive abnormalities is expressed in a multitude of psychological, somatic

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and behavioural problems, ranging from learning disabilities to aggression against self and others [3–11].

While the research literature contains extensive studies and clinical observations on children exposed to one-time trauma, such as kidnapping, sniper attacks and earthquakes [12,13,14,6], with the notable exception of the work of Cicchetti *et al.* [15–19] and Putnam and Trickett's [20–23] work, there has been a dearth of systematic research on the developmental pathways following prolonged childhood trauma and its specific effects on the child's physical, cognitive and emotional maturation. This paper will review some of the existing literature and provide an array of clinical observations on a cohort of children with histories of chronic intrafamilial abuse.

The scope of the problem

In the USA approximately three million children are reported for abuse and/or neglect each year [24]. Fifteen out of every 1000 children are substantiated as having been abused. In a survey of 16 000 adults attending an HMO (Health Maintenance Organisation) in California, 22% reported having been sexually abused and 12% physically abused as children. In a random sample of 1225 women members of an HMO, 18.4% reported a history of childhood sexual abuse, 14.2% reported physical abuse, and 24.1% reported having been emotionally abused during childhood [25]. Kendall-Tackett *et al.* [26] reported that 27% of women and 16% of men had a history of childhood sexual abuse. It is estimated that neglect occurs three times as often as abuse. These figures roughly match those from a German study which showed that 10% of 2432 people were victims of physical abuse, 38 (4%) of whom had sustained prolonged physical abuse [27]. Sexual abuse in girls ranged between 6 and 36%, depending on how the abuse was classified. That means that 50% of the registered abuse is intense or very intense.

The vast majority of people (about 80%) responsible for child maltreatment are the child's own parents. Other relatives of the child are to blame for another 10% of cases. Less than 10% of perpetrators therefore are not related to the maltreated child. The US Department of Health and Human Services' study of national incidence and prevalence of child abuse and neglect (NIS-3) [28] further revealed that among confirmed cases of maltreated children, 65% were victimised by a female and 54% by a male. The type of abuse was related to the gender of the perpetrator. Children were twice as likely to be neglected by

women than by men. This is consistent with the fact that women still represent the vast majority of primary caregivers. Men were more likely to physically abuse children than were women; 67% versus 40% respectively. Sexual abuse was the category most strongly linked with males: 88% of sexually abused children were abused by men and 12% by women, in Germany 83% by men and 17% by women. According to NIS-3 [28], girls were sexually abused three times as often than boys, while boys had a 24% greater risk of serious injury from abuse and were 18% more likely to be emotionally neglected. In Germany boys have three times the risk as girls of being physically abused.

About twenty per cent of parents who were abused as children go on to abuse their own children. Seventy-five per cent of perpetrators of child sexual abuse reported that they had been sexually abused themselves during childhood [29]. Moreover, physical abuse and neglect are associated with the highest rates of arrest for violent offences [30,31], as well as with the development of antisocial personality disorder. Widom and Maxfield [31] reported that by age 32, almost half of those arrested for non-traffic offences had been the victims of abuse and neglect. These figures suggest that child abuse and neglect perpetuate violence in adulthood as well as in generations to come and thus contribute to an intergenerational cycle of violence.

Clinical presentation

In order to illustrate the complexity of the symptomatology of these children we present a brief case vignette: 8-year-old J. came for inpatient treatment following severe sexual abuse, including vaginal intercourse, beating by her father and neglect by her mother. She displayed binge eating followed by vomiting (bulimia), food hoarding, restlessness, sudden aggressive actions, sleep disturbance with nightmares ('no, Daddy, don't do that!'), flashbacks and trance-like states, accompanied by marked general developmental retardation: physically, she appeared like a 6-year-old, but her behaviour was more like a 4-year-old. J. had lived for the last 3 years with a foster mother. She had been removed from her family by court order after her behaviour in kindergarten gave strong indication of sexual abuse and neglect. For example she sometimes tried to sit with her genitals on her (female) teacher's face. J. frequently displayed a 'frozen' reaction in the course of everyday activity. Her face took on a mask-like expression, she

moved in a jerky, tense manner, often giggling with shame, incapable of taking in anything of her surroundings. She often retreated to a small-child state, often appearing dreamy or absent, and she would suddenly cry without apparent provocation. On occasion she would become beside herself with pleasure, fall on the floor and pound her heels. Her sexualised language, her sexualised presentation of herself, her affect instability, lethargy and her avoidance of a fantasy life were pervasive.

Selma Fraiberg [32] was one of the first pioneers to systematically describe the clinical presentations of very young children in the aftermath of abuse. She describes different gradations from deregulated attachment to active participation in a traumatic dyad. Lenore Terr [33] subsequently made an attempt to organise the effects of trauma on children within the framework of posttraumatic stress disorder (PTSD), documenting intrusive thoughts, nightmares, and repetitive re-enactments and play behaviour in these children. She differentiated two types of trauma responses: type A, following one-time traumatic experiences and type B, in response to chronic exposure [34]. These formed a useful beginning for the formulation of diagnostic and treatment issues in chronically traumatised children.

Because multiply abused infants and toddlers often experience developmental delays across a broad spectrum, including cognitive, language, motor and socialisation skills [35] they tend to display very complex disturbances with a variety of different, often fluctuating, presentations. Symptoms of PTSD in chronically traumatised children usually are not prominent and tend to be obscured by their other cognitive, affective, social and physical problems. In one study of 364 abused children in the USA [36], 58% suffered from separation anxiety/overanxious disorders, 36% from phobic disorders, 35% from PTSD, 22% attention deficit hyperactivity disorder (ADHD) and 22% oppositional defiant disorder. In prospective study by Putnam [21] of a group of sexually abused girls anxiety, oppositional disorder and phobia were clustered in one group, while depression, suicidality, PTSD, ADHD and conduct disorder represented another cluster. While these children may receive a variety of psychiatric labels, none of these diagnoses capture their profound developmental disturbances, nor the traumatic origins of their particular clinical presentations.

Lack of capacity for emotional self-regulation is probably the most striking feature of these chronically traumatised children [37]. This leads to problems

with self-definition as reflected by (i) a lack of a continuous, predictable sense of self, with a poor sense of separateness and disturbances of body image; (ii) poorly modulated affect and impulse control, including aggression against self and others; and (iii) uncertainty about the reliability and predictability of others, leading to distrust, suspiciousness, and problems with intimacy [38]. They have distinct alterations in states of consciousness, with amnesia, hypermnesia, dissociation, depersonalisation and derealisation [20], flashbacks and nightmares of specific events, school problems, difficulty with orientation in time and space and they suffer from sensorimotor abnormalities.

Having been exposed to environmental extremes and often lacking an adult who provides continuity they have problems understanding both who they and who other people are. They literally are 'out of touch' with their feelings, and often have no language to describe internal states [3]. They tend to ascribe their own feelings to others and to incorporate other people's attitudes and behaviours without being able to filter what is relevant and what is not.

Living in an unpredictable world interferes with the development of object constancy; as a result, they lack verbal and conceptual representations of both their inner world and of their surroundings. As a consequence, they have little sense of their own contributions to what happens to them. Without internal maps to guide them, they act instead of plan, show their wishes in their behaviours, rather than discussing what they want. They take, rather than ask. Unable to appreciate clearly who they, or others are, they do not know how to enlist other people as allies on their behalf; people are sources of terror or gratification, but rarely fellow-human beings with their own sets of needs and desires. They have difficulty appreciating novelty; without a map to compare and contrast, anything new is potentially threatening. What is familiar tends to be experienced as safer, even if it is a predictable source of terror.

These children rarely discuss spontaneously what has happened to them and have little insight into the relationship between what they do, what they feel and what has happened to them. They tend to communicate the nature of their traumatic past by repeating it in the form of interpersonal enactments: in their play and actions.

Children who have experienced violence have problems managing in social settings. They tend to be withdrawn, or to bully other children. Unable to regulate their affects, they tend to scare other children

away and lack reliable playmates. Many have severe learning problems (29% in one study in the USA), and are vulnerable to a range of physical illnesses. As adults, they have between 10 and 15% increased chance of suffering from cancer, heart disease and diabetes [26]. During adolescence they tend to engage in destructive acting out against themselves and others, and are three times as likely as their non-abused peers to engage in drug abuse, self-mutilation and violent/aggressive behaviour against others [26].

Without early intervention there is little evidence that children outgrow these problems. As adults, they have a vastly increased chance of meeting diagnostic criteria for borderline personality disorder [39], somatisation disorder (e.g. [40]), dissociative disorders (e.g. [20,41–44]), self-mutilation [6], eating disorders [38,45], and substance abuse [25].

Normal child development

Children are born with an innate capacity to engage in behaviours that engender protection [46,47]. They do this by smiling, gurgling, crying and sending out various distress signals that allow them to actively participate in the subtle interactions between mother and child. This permits an almost immediate correction of dissonances in this synchronisation process. In addition, newborns are equipped with sensory and motor abilities that make it possible for them to attribute causal, as well as affective, meaning to incoming information [48–50]. This facilitates the rapid development of rather accurate perceptions of duration and intensity.

Young children, still ‘embedded’ in the here-and-now and lacking the capacity to see themselves in the perspective of a larger context, have no choice but to see themselves as the centre of the universe: everything that happens is directly related to their own sensations. Development consists of learning to master and ‘own’ one’s experiences and to learn to experience the present as part of one’s personal experience over time [51,52]. Piaget and Inhelder [53] called this ‘decentration’: moving from *being* one’s reflexes, movements and sensations to *having* them.

A child needs to develop categories in order to be able to place any particular experience in a larger context. Predictability and continuity are critical to developing a sense of causality and for learning to categorise experience. Only when they can do this will they be able to evaluate what is currently going on and entertain a range of options with which they can affect the outcome of events. Imagining being

able to play an active role leads to problem-focused coping. Severely traumatised children tend to have major deficits in their capacities for integration which is reflected in neuropsychological testing as deficits in executive functioning [54].

Studies such, as those of the Mannheim ‘children at risk’ [55] have demonstrated that adequate mothering can markedly affect the long-term impact of poor biological risk factors. The more exposure children have to different risk factors, the less resilient they will be. Having a caregiver who makes a deep commitment to the welfare of a child is probably the greatest source of resilience.

Stress regulation and attachment

Normal play and exploratory activity in children requires the presence of a familiar attachment figure who modulates their physiological arousal by providing a balance between soothing and stimulation. The heart rate curves of mothers and infants parallel each other during interactions [56]. This capacity of the mother to modulate physiological arousal reinforces the child’s attachment to her, and allows a smooth alternation between activities that increase and reduce arousal as they go back and forth between exploring the environment and returning to their mothers. Stern [57] calls this ‘affect attunement’ between caregivers and infants. In his studies about 48% of the mother’s behaviours were described as attunements or mirroring-echoing of the infant’s behaviour in either the same or a different modality.

The response of the caregiver not only protects the child from the effects of stressful situations by providing soothing when appropriate, it also enables the child to develop the biological framework for dealing with future stress [58–60]. In this process the mother plays the critical role of psychoneurobiological regulator of the child’s affective states [61,62]. Learning to have controllable stress reactions seems to result in central nervous system (CNS) connections that promote dealing with subsequent stresses.

The attachment relationship creates an inner map of the world [46,57,62]. This map determines what image the child has of him or herself, caregivers and the way the world works. This inner image of the world is comprised both of cognitive and affective knowledge of the world [63]. Emotions (i.e. subjective knowledge) are the interpreters of present situation, by linking the present experience with the past [64]. The particular emotions that are evoked by incoming information determine both the intensity of

the reaction, as well as the stereotypy of the response. In order to formulate a flexible response, emotions need to be modulated by a cognitive understanding of what is happening. Both emotion and cognition are important: children who only use cognitive schemes and have no contact with their emotions are as disturbed as those who only use emotion.

If children are exposed to unmanageable stress, and if the caregiver does not take over the function of modulating the child's arousal, as occurs when children are exposed to family violence, the child will be unable to organise and categorise its experiences in a coherent fashion. Cicchetti and Beeghly [15] have shown that 80% of traumatised children have disorganised attachment patterns. This means that they can neither regulate their emotional states, nor rely on others to help them: they respond with fight or flight reactions. When this happens they cannot integrate incoming information and tend to ignore important aspects of their experience. As a result, their behaviour becomes disorganised. In her infant studies, Mary Ainsworth has described four ways in which infants organise their behaviour in regard to their care givers: secure, anxious/avoidant, disorganised and ambivalent. These patterns are a function of differences in mothers' responsiveness to the signals of their children and how they subsequently cope in social settings [65].

Early patterns of attachment have powerful effects across the lifespan because they set the stage for how children process information [63,66]. Secure infants tend to grow up being able to rely on both their emotions and thoughts to help them determine their reactions to any given situation. They have learned to integrate emotions and thinking. Their experience of feeling understood provides them with the confidence that they are capable of making good things happen, and that if they do not know how to deal with difficult situations they will be able to find people who can help them find the appropriate solutions. Secure children learn a more complex vocabulary for describing their emotions (such as hate, disgust and anger) and spend more time describing physiological states such as hunger and thirst than maltreated children [3]. This allows them to communicate how they feel and to formulate more efficient response strategies.

When caregivers are extraordinarily inconsistent, frustrating, violent, intrusive or neglectful, children are likely to become intolerably distressed, without a sense that the external environment will provide relief. Not being able to rely on their caregivers, these infants experience excessive anxiety, anger and

desires. These feelings may become so extreme as to precipitate dissociative states or self-defeating aggression. These frightened, spaced-out and hyper-aroused children learn to ignore either what they feel (their emotions) or what they perceive (their cognitions) [63]. Not being able to coax their caregivers into providing them with comfort and safety, they reconstruct their inner experience in order to modulate their arousal levels.

Secure children learn how to effectively take care of themselves as long as the environment is more or less predictable, while, simultaneously, they know how to get help when they are distressed. They grow up to become individuals who are able to rely on both emotions and thinking to help them in determining their reactions to any given situation. They carry with them an overarching sense of feeling understood, because they encode the responsiveness of their caregivers in their views of themselves and have the sense that they were responsible for making these good things happen.

Avoidant infants ignore their distress and desires and deal with their needs by depending excessively upon the logic of what they can observe. Being able to inhibit their distress protects them against further hurt. They tend to present a false positive exterior which does not match what is happening to them [63,66]. On the surface they appear more independent than others, but they are unable to derive comfort from friendships and intimacy. This leaves them unaffected by psychotherapy in which a major currency is the warmth of mutual relatedness.

In contrast to avoidant children, anxious/ambivalent infants tend to grow up relying on what they are feeling, without much thought about the consequences of their actions. Confused about what they perceive, they tune in to their feelings, at the expense of being able to think about the meaning of their experiences. This keeps them out of touch with their environment. However, in contrast to the avoidant group, they continue to feel an intense need for social support, in which they tend to repeat their abusive relationships and feel misunderstood and mistreated. Logical arguments generally have little impact on their being able to adjust their expectations [61,63,66].

Biological dimensions

How new experiences are perceived, remembered and integrated into the totality of the inner world is a function of the biological structures that are 'on-line' for the interpretation of sensory input. As children

mature, structural and neurochemical changes in the brain allow for ever-more complex cognitive organisation of experience: experience and brain combine to determine how children interpret their reality [67]. While the fundamental neuroanatomical structure of the brain is determined by the genome, the particular templates for the categorisation and interpretation of experience, located in the limbic system and frontal lobes, gradually develop as a child grows up. During the time that the structure of the brain is being organised, experiences shape the particular patterns of dendritic branching and neuronal structures in a use-dependent fashion: the products of the patterns, intensity and frequency of neuronal stimulation received during critical periods of brain development [60]. This early organisation orchestrates the long-term patterns of learning and cognition that determine how a person deals with subsequent information. Different brain areas mature at different speeds. As a result, the expression of emotion changes in course of development, largely as a function of the maturation of neural inhibitory mechanisms [60].

At birth, the brainstem areas responsible for regulating cardiovascular and respiratory functions are already fully functioning. This allows infants to take care of these without assistance. The limbic system, which fine tunes the regulatory functions of the hypothalamus and brain stem and serves as a filter that determines what sensory input is relevant for further mental processing, takes much longer to be myelinated. This system is central for self-preservation and procreation, parenting and play. The amygdala rapidly appraises complex information for its existential relevance and organises self-protective behaviour by signalling the emotional intensity that particular stimuli evoke. Signals from the amygdala initiate autonomic responses, such as increased heart rate and blood pressure, and activate defence (flight or fight) and freeze reactions. The limbic appraisal system circuit bypasses cortical evaluation, which allows for quick emergency responses. These are geared for protection, but, if a particular stimulus is misinterpreted as a threat, leads to immediate inappropriate fight/flight/freeze responses to non-threatening stimuli. This causes this system to react to minor irritations in a stereotyped, totalistic manner. These immediate responses are so difficult to extinguish that LeDoux *et al.* have called the memories associated with these limbic circuits 'indelible' [68].

Learning from experience means that what happens needs to be registered in the prefrontal

cortex, compared with other experiences and evaluated for an appropriate response. The capacity for representational memory, which is a function of the maturation of the frontal cortex, is a cornerstone for the development of a delayed response function. This allows people to react to situations on the basis of stored or internalised representations, rather than on information immediately present in the environment [60]. When children feel that they are being threatened the fast tracts of the limbic system are likely to be activated before the slower prefrontal cortex has a chance to evaluate the stimulus [56]. In order to adaptively respond to its environment a child needs to feel calm enough to first form an accurate perception of incoming stimuli. Only when they are not hyperaroused can they activate the frontal cortex which is needed for subtle stimulus discrimination, learning and problem solving [69].

In order to modulate an emotional response with cognitive processes, children must develop 'object permanence': the recognition that an object has continuity in time and space. This means being able to understand that something exists, continuously and independent of the child [60, p.176]. This represents what Bowlby [46] called 'internal working models'. These working models are thought to be largely defined by the internalisation of the affective and cognitive characteristics of primary relationships. Children learn to regulate their impulsive behaviour by being able to anticipate the mother's response to it [60, p.179]. Thus, neural development and social interaction are inextricably intertwined. As Tucker [70, p.199] says: 'For the human brain, the most important information for successful development is conveyed by the social rather than the physical environment. The baby brain must begin participating effectively in the process of social information transmission that offers entry into the culture.'

In recent years there has been a gradual accumulation of hard data on how caregivers become the 'hidden' regulators of the infant's immature endocrine and nervous systems. It has been shown that attunement helps regulate the infant's hypothalamic production of corticotrophin releasing factor (CRF) [60]. Corticotrophin releasing factor controls the synthesis of adrenocorticotrophic hormone (ACTH), a hormone that facilitates imprinting. Corticotrophin releasing factor also regulates the production of β -endorphin. Vagal tone, which indexes tonic levels of activation of the parasympathetic branch of autonomic nervous system, also plays a major role in the ability to regulate emotions [71]. The role of these various

neurohormones is to provide the physiological capacity to appraise danger and formulate the behavioural response necessary for active coping or avoidance.

Traumatised children tend to have serious problems carrying out a host of these functions. Their system tends to become increasingly responsive to relatively minor stimuli by means of the processes of sensitisation and kindling [72]. This may involve both decreased frontal lobe functioning and increased limbic system (amygdala) sensitivity. This leads to immediate motor responses, which, if irrelevant, would be perceived as impulsive reactions. Because of stimulus generalisation, maltreated children respond to minor triggers with a variety of full-blown catastrophic reactions: ordinary stresses become full-blown disasters. Such impulsive reactions could be generated at various levels of the CNS: the brainstem would initiate fixed action patterns, the cerebellum would play a role in activating sensorimotor schemata, while the limbic loop would precipitate contextually elicited fight, flight or freeze responses [67]. Decreased frontal lobe functioning prevents understanding of the larger context in which a particular event occurs, leading to decreased inhibition of subcortical systems. Interventions that address the problems on any of these different levels would be effective [72].

To date, most research on the biological dimensions of developmental trauma are based on animal experimentation. Only a small number of studies have specifically measured biological abnormalities in abused and neglected children. Among the most noteworthy of these are the studies by Frank Putnam *et al.* and Martin Teicher *et al.* [73]. Putnam's group has shown that sexually abused girls develop major neuroendocrine disturbances in the areas of immune, corticosteroid and thyroid and sex hormone functions [21,23,74–77]. They have shown that early trauma can reset the hypothalamic-pituitary-adrenal axis by blunting its response to future stress. Two studies have found elevated measures of immune response in the sexually abused compared with controls, as indicated by antinuclear antibody titres [23,78]. This difference in immune function may help to explain the large difference in health outcomes that has been found to be associated with sexual abuse.

Martin Teicher *et al.* [73] have shown that childhood physical abuse decreased volume of the corpus callosum; in addition, abuse was associated with differential activation between the left and right hemispheres under stressful and calm conditions. They found a 38% increased rate of limbic system abnormalities following physical abuse, 49% after sexual

abuse, and a 113% increase following combined abuse. More recently they have found a decrease in the size of the medial part of the corpus callosum and the vermis of the cerebellum in abused children [Teicher M, personal communication, 2000].

Patterns of reactions to chronic traumatic stress

Under ordinary conditions, children use play to deal with upsetting experiences. In the process of doing so, they minimise the objective threat and regulate their emotional distress. By introducing distortions, omissions and by reframing aspects of their experiences they usually manage to weaken and transform their image of what has happened and create new versions of what they can do [6,79,80].

At the core of traumatic stress is an inability to modify the impact of the overwhelming events. Not having a caregiver who can modulate their arousal causes a breakdown of the capacity to play, process, integrate and categorise what is happening; abused and neglected children dissociate or, in the worst cases, disintegrate. The relevant sensations, affects and cognitions cannot be associated (they are dissociated into sensory fragments [81]) and, as a result, these children cannot comprehend what is happening and devise and execute an appropriate plan of action.

When children are unable to respond appropriately, they become helpless. Being unable to grasp what is going on, they go immediately from (fearful) stimulus to (fight/flight) response without being able to learn from the experience [82,83]. In response to reminders of the trauma (sensations, physiological states, images, sounds, situations) they behave as if they were traumatised all over again. Unless caregivers understand the nature of such re-enactments they are liable to label the child as 'oppositional', 'rebellious', 'unmotivated', and 'antisocial'. Many problems of chronically traumatised children can be understood as efforts to minimise the objective threat and to regulate their emotional distress [6].

The clinical presentation of any particular traumatised child is the result of a combination of these dissociative and disintegrated responses and their trauma-specific reactions, such as avoidance, flight/flight, freezing, compliance, behaviour or affect transformation [11,14,32,84–88]. Adults tend to misinterpret the hostility, silence or other reactions of maltreated children as responses to current events, rather than as conditioned reactions to reminders of the past.

We differentiate roughly four different categories of responses in children exposed to chronic interpersonal violence. These are a function of (i) temperament; (ii) severity and duration of the trauma; and (iii) how far along the person is in her or his personality development when the trauma occurs. These primary adaptations interact with varying levels of dissociation, loss of play capacities and learning problems to produce complex clinical presentations.

Flight/fight

Most traumatised children display fluctuating levels of ego organisation. Hyperarousal, fighting and destructive behaviour alternate with numbed depression and withdrawal. Confronted with stress, they are prone to regress to earlier developmental levels or adopt different states of ego organisation, ranging from infantile and near psychotic to hypermature behaviour. Adults, confronted with such fluctuating behaviours, may misinterpret them as willful manipulations, rather than as state-dependent response patterns.

Accommodation/compliance behaviour

In structured environments children with accommodation/compliance behaviour [62,89,90] behave on the basis of what they think is expected from them, without getting emotionally involved. This is accompanied by depersonalisation and loss of fantasy play. Winnicott [91] called this the development of a false self. However, under stress, these children tend to lose their physiological regulation and become disorganised and (self) destructive. This response pattern is predominantly seen in girls.

Frozen stillness

A third category of children mainly respond to stress by freezing, avoidance and sensorimotor constriction. This is accompanied by the pathological persistence of early reflexes, problems with lateralisation, as well as robot-like behavioural and somatic re-enactments of traumatic scenes.

Dissociation of the personality

Many traumatised children respond to stress splitting their personality into different entities (tertiary dissociation [92]). These children cannot integrate

different states of emotional engagement within the same personality organisation and experience themselves as different people at different times, depending on internal and external stimuli [20,93].

Because these different clinical presentations represent the primary organisations to exposure to chronic trauma we will describe them here in more detail.

Flight/fight responses

Trauma and neglect cause a loss of the capacity for self-regulation. Loss of self regulation interferes with the capacity to figure out precisely what is going on and formulate an appropriate response. As a result, traumatised children have problems controlling their emotional responses and modulating their behaviour. They are bound to experience current stressors with an emotional intensity that belongs to the past, and that has little value in the present. Loss of self-regulation is expressed on a variety of levels: as attentional problems (as a loss of ability to focus on appropriate stimuli, learning problems), or as an inability to inhibit action when aroused (loss of impulse control) with uncontrollable feelings of rage, anger or sadness. Unaware of the traumatic antecedents of these feelings, they are prone to experience both their own affect storms, as well as the emotional reactions from others, as re-traumatising. Thus, the feelings that belong to the trauma are continually re-experienced on an interpersonal level: traumatised children tend to lead traumatising and traumatised lives [9,10,94].

Children tend to notice their dyscontrol and grow to hate themselves for behaving this way. Because they cannot regulate themselves, they are prone to medicate themselves with drugs, starving and bingeing, or with self-injurious behaviour [8]. Obviously, those adaptations only lead to further misery.

In an attempt to compensate for their hyperarousal, they tend to shut down: by emotional numbing, dissociation, depersonalisation and derealisation, which may extend to both trauma-related, and everyday experience [20,95]. In boys, the switch between hyperarousal and dissociation seems to be most common. Traumatised girls are often numb, withdrawn and dissociated [96].

Avoidance, compliance and loss of fantasy

Since the quality of one's relationships to one's parents is initially the principal source of information

about who one is, and how people negotiate relationships, it is not surprising that abused and neglected children are faced with enormous challenges in constructing meaningful lives and safe interpersonal relationships. Summit uses the term 'child abuse accommodation syndrome' [90], in his descriptions of how traumatised children and adolescents learn to adapt to the realities of their lives. Some form of accommodation is necessary for survival. Preoccupation with survival prevents the capacity to playfully and curiously try out a variety of ways to engage with the outside world [53,97,98].

Sexually and physically abused children often display marked avoidant/dissociative symptoms [21,95,96]. Sometimes they simply block out all contact, avoiding eye-contact and other forms of interaction. They stabilise their emotional lives by emotional constriction. Superficial compliance helps them avoid the total breakdown of their relationships. Their compliant behaviour serves as a way to tolerate contact, when people are largely experienced as potential sources of pain. The price for behavioural compliance is the loss of capacity to access their feelings that are necessary for fantasy play [97,99]. Being cut off from the world of nurturance and play, they are unable to accurately emit and read social signals [56]. The emotional lives of these children are as frozen and constricted as their behaviour. They may laugh, rather than cry when they are hurt, rather than showing distress, they may display frozen 'happiness'. These children seem unable to feel genuine pleasure and joy [32]. While the behaviour is often superficially appropriate to the situation, there is little emotional involvement.

The adaptation of these children has been termed 'mimicry' [93,100,101]. Winnicott [91] has described this superficial readiness to accommodate as the development of a false self. This concept, however, suggests the existence of both a false and a true self-organisation, something for which there is little evidence. Not knowing their own feelings, these children also cannot feel empathy for others; under stress, they pass the dehumanisation that they themselves have experienced on to others.

Freezing and lack of sensory integration

The foundation of the development of self-awareness and self-regulation rests on learning to comprehend the nuances of physical sensations. The way people interpret the meaning of incoming information depends largely on the meaning that they assign to the physical sensations that these experiences provoke [64]. As

children develop, they gradually learn how to interpret, manage and act upon internal physical sensations. By accumulating a store of effective actions in response to sensory input, secure children learn to select the most appropriate response, and, failing that, to look for outside help to cope [63].

Unable to process sensory input into coherent perceptions makes them unable to engage in appropriate reactions. Their emotional reactions may change the way their bodies function, for example with impaired pain perception [102]. While they may be hypersensitive to physical contact, they cannot localise skin contact and have difficulty identifying and categorising parts of their bodies. Many children have problems with coordination, balance, body tone and they are easily disoriented in time and space [7,84,103].

Having problems interpreting incoming information makes them react inappropriately. Triggered by reminders of their past, these children suddenly begin to cry, or regress to an earlier stage of development (e.g. by crawling on the floor or losing bladder control). Often, they do not speak coherently, but, instead, only make noises and look threatened [104,105]. Abused children may inflict perioral wounds on themselves, have pseudoseizures and make facial grimaces without knowing why. They often show an inhibited or exaggerated startle [84]. Many of these children have poor right-left coordination. The finding of decreased size of the corpus callosum and the cerebellar vermis in abused children [73], as well as the decrease in hippocampal volume [106] provides possible neuroanatomical explanations for these developmental abnormalities.

Dissociation

'Dissociation' refers to a compartmentalisation of experience: elements of a trauma are not integrated into a unitary whole or an integrated sense of self. Dissociation is a broad descriptive term that includes a variety of mental mechanisms involved in disengaging from the world such as distraction, avoidance, numbing, daydreaming fugue, derealisation, depersonalisation. Dissociative processes play a critical role in the development of trauma-related psychological problems (e.g. [107–109]). When children develop distinct ego-states that contain the traumatic experience, consisting of complex identities with distinct cognitive, affective and behavioural patterns, we call this Tertiary dissociation [92,109]. Different ego states may contain the pain, fear or anger related to particular traumatic experiences, while ego states

that are unaware of the trauma and its concomitant affects continue to be able to discharge the routine functions of daily life.

Dissociation in children is a powerful predictor for the development of other psychopathology over time [19,20]. Ross *et al.* estimated that 20.7% of psychiatric inpatients suffer from dissociative disorders and 5.4% from full-blown multiple personality disorder (MPD), now known as dissociative identity disorder (DID). Approximately two-thirds of dissociative patients also met criteria for somatisation disorder, borderline personality disorder and substance abuse [41].

Dissociative experiences cause these children to deny having engaged in actions that others have clearly observed. They confuse their treatment teams by quickly switching from one state to another. Sometimes such switches are misinterpreted as 'resolutions' of their problems, or as wilful manipulation of the therapeutic environment. These frequent changes in presentation over time may frustrate their caregivers and lead to trials on large numbers of different medications and rapidly changing treatments plans.

Capacity to play

Childhood trauma interferes with the capacity for play. The purpose of child's play is to try out different social roles and different outcomes: to find out how others experience the world and to develop control and competence in dealing with feared emotions, people and situations. Important interactions are, in a sense, rehearsed, tested and then either integrated or discarded. Normal play is an activity carried out with joy and concentration [110]. Thus, play is a major source of self-respect and an essential way of coping with stressful life events. In contrast, posttraumatic play is rigid and constricted: the same topics are concretely and constantly repeated with no modification over time. These children can respond to non-affective stimuli in a rote manner, but when involved with ambiguous or affectively charged stimuli they respond to the present as if they were back in the traumatic situation [79,80]. They either respond with an intensity which was appropriate to the trauma, or they barely react at all.

These children lack the capacity to symbolise, fantasise or sublimate. They experience distress and helplessness where non-traumatised children experience mastery and pleasure [11]. Because the pressure from reality is so intense, they cannot suspend reality for awhile and escape into fantasy to anticipate or modify their emotional responses: play and reality merge

[111,97]. Hence, for these children, play often becomes a re-traumatisation. As a result, they are deprived of precisely those mechanisms which allow children to cope with the problems of everyday life. This lack of affect tolerance interferes with the ability to accumulate restitutive, gratifying experiences [97,98,102].

Learning difficulties

Children with developmental trauma often show severe learning problems. The attentional disorders in these children have several causes. They do not pay attention because they are unable to distinguish between relevant and irrelevant information. They tend to misinterpret innocuous stimuli as traumatic, and, if not interpreted as traumatic, they tend to ignore sensory input [102,112].

Easily threatened by the unexpected, traumatised children are prone to become excessively physiologically aroused when faced with novel information. Problems with processing of novel information and difficulties forming mental images of present, past or future are closely intertwined: they interfere with being able to learn from experience [113,114]. These children are easily overstimulated and cannot achieve the state of secure readiness that is necessary in order to be open to new information. The feeling of being threatened is easily activated, leading to transient, aggressive dissociative episodes. Only if children feel secure can they experience a real sense of curiosity. Vulnerability to hyperarousal makes it difficult to tolerate uncertainty [82,97,114]. Because the world is a terrifying place, they have little interest in exploring it. As a result, many of these children insist on a boring sameness in their environment. Avoiding novelty also leads to the avoidance of social contact. Hence, they miss out on the normal transmission of social skills (language, social graces and cultural education).

Many traumatised children have acoustic and visual perceptual problems; their comprehension of complex patterns is vague, crude and undifferentiated. Their sensory shut-down [115,116] makes it difficult for them to integrate concepts and to comprehend information simultaneously on different levels of abstraction. Their difficulties with sensory processing interferes with their making sense of incoming input. Their speech problems interfere with understanding complex situations and the narration of complex stories. Many have limited capacity to comprehend complex visual-spatial patterns. This, in turn, leads to problems with reading and writing.

Findings of hippocampal atrophy and memory deficits in PTSD may have broad implications for understanding abnormal child development. Given the important role that the hippocampus plays in learning and memory, victimised children may develop deficits that may plague throughout the rest of their lives [106,117,118].

Therapy

Overcoming traumatic re-enactments

Central in the treatment of traumatised children and adolescents there often is a painful dilemma of whether to keep the child in the care of people or institutions who are sources of hurt and threat, or whether to create abandonment and separation distress by taking the child away from familiar environments and people to whom they are intensely attached, but who are likely to cause further substantial damage. Treatment often is complicated by the looming presence of trauma, such as when an abused girl is afraid to stay away from home for fear that other siblings will be abused in her absence, or when an outside expert asks for yet another gynecological examination, or when there does not seem to be anybody who takes responsibility of the welfare of these children, such as a teacher or foster home parents who make sure that the child receives adequate therapy. Ultimately, learning from experience is only possible when a child feels secure enough to be open to new possibilities.

Hence, it is essential to establish a safe space for these children that takes into account the real conditions in which they live, such as potential exposure to a perpetrator, as well as their own potential as perpetrators, such as their torturing and threatening other children. In the therapy of chronically traumatised children one is continually confronted with their primitive self-protective behaviours that are likely to lead to repetitions of their traumatic past in the present. By engaging in acts that seem designed to provoke other children and caregivers to hurt them, they seem to deliberately try to undermine many attempts to provide them with safety. At the core of posttraumatic symptomatology is the tendency to repeat one's traumas, rather than being open to new experiences. These children tend to communicate what happened to them not in words but by re-creating their traumatic conditions. People in their environment often have an uncanny ability to actively participate in those re-enactments; teachers or therapists may

forget that a child had an appointment and forget to show up, children who have been locked up end in seclusion, people who have been orally abused may be force-fed [11].

Unless this compulsion to repeat is recognised, the response of the environment is likely to become a replay of the original abusive, but familiar, relationships. Because these children are prone to experiencing anything novel, including rules and other protective interventions, as punishments, they tend to regard their teachers and therapists who try to establish safety, as perpetrators. Faced with their fighting, withdrawal, shyness and inability to read social cues, their caregivers have a tendency to deal with their frustration by retaliating in ways that uncannily repeat the earlier traumas. Given this compulsion to repeat the trauma, the early stages of treatment usually consist largely of a ongoing struggle to establish safe and predictable conditions where they will not get hurt, where the rules are clear, and where they will be kept from hurting others.

Establishing safety and competence

Children will not give up their primitive self-protective behaviours until they learn how to feel competent and secure. They need to gradually acquire a sufficient sense of predictability and stability to allow them to let down their guard and let in new experiences. Children need to be distracted from their habitual fight/flight/freeze reactions by engaging their attention in pursuits that (i) are not trauma-related triggers, and (ii) which give them a sense of pleasure and mastery. Since most of the trauma was interpersonal, it is very helpful for the treatment and has a good prognosis if safety is found outside the interpersonal realm: as with computer games, in nature, in athletic pursuits, in music and in stories that they listen to on cassette players. The experience of safety, predictability and 'fun' is essential to establish the capacity to observe what is going on, to put it into a larger context and initiate the appropriate physiological and motoric response.

Once a child develops the elementary capacity to focus on pleasurable activities without becoming disorganised he or she has a chance to develop the capacity to play with other children and engage in simple group activities. Only if they can engage in activities that do not trigger defensive reactions can they start experiencing the safety and fun that non-abused children ordinarily have. Without these elementary capacities to observe before reacting they are not

able to remember and work through their traumatic experiences without becoming disorganised.

Thus, the initial phases of treatment need to focus on establishing a safe space in which play remains fantasy and does not become so real as to require life or death motor responses: fighting, fleeing or freezing [97,119]. The children need to learn to know what they feel, put those feelings into words and play with fantasy, or some other symbolic expression (drawing, play acting) that can allow them to gain distance from the traumatic events, and help them imagine alternative outcomes.

Attention to the body: integration and mastery

Mastery is most of all a physical experience: the feeling of being in charge, calm and able to engage in focused efforts to accomplished the goals one sets for oneself. Traumatized children experience trauma-related hyperarousal and numbing in their bodies. Their somatic hyperarousal can be easily observed in their inability to relax, and by their high degree of irritability. They need to learn to grasp what is happening and learn to tolerate trauma-related bodily sensations and emotional states.

Many traumatized children have great difficulty doing two things, such as obeying rules and engaging in physical activities, at the same time.

Children with 'frozen' reactions need to be helped to re-awaken their curiosity and to explore their surroundings. As long as they remain numb and dependent on others, they fail to accumulate restitutive experiences and quickly abandon new projects. Neutral, 'fun' tasks and physical games can provide them with knowledge of what it feels like to be relaxed and to feel a sense of physical mastery. This serves as an essential antidote to feeling frozen or hyperaroused.

Body-focused therapy can uniquely help the child coordinate and integrate perceptions with motor actions to accomplish appropriate actions. This therapy is necessary to help the child stay physically focused, to interpret his or her somatic feedback reactions and to tolerate physical sensations without becoming hyperaroused and impulsive, or freezing. Body-oriented therapy includes such simple exercises as holding piece of a paper in the one hand and cutting it with the other, learning to read a line from left to right without getting stuck mid-line (possibly related to decreased corpus callosum functioning), working on keeping their equilibrium on balance beams, or on large inflatable balls to help them overcome problems with their vestibular system, or helping them find a sense of calm by swinging on a

hammock and learning to focus on bodily sensations that signify safety and control.

These children who have been living in a climate of fear and unpredictability need to learn to anticipate, to develop categories, to sequence, to differentiate time and space. They need help with synchronisation and coordination and need to play games that involve clapping their hands and singing at the same time. Many of these children have lost the sensation of pain and need work on re-establishing proper tactile perceptions. Special attention needs to be placed on learning to form representations of the physical space in which they live; the boundaries of where they end, and the outside world begins. They can do this by, for example, drawing an outline of their bodies on large puzzle blocks. It can be useful to name, move and fit the body parts into the overall picture. They need to learn to locate their body in space, and do exercises to recognise various sensations in their skin, to articulate what it feels when people move towards their bodies, and learn to tell people to stay at a safe distance. They need exercises to help them establish a sense of space and time, such as dividing the clock with a rope. They can learn more about feelings in their bodies, and its boundaries, by wrapping blankets around themselves. In order to learn the feeling of warmth and safety in their bodies they benefit from getting a bubble bath several times a week [11].

The issue of touch is a delicate one: how much touching is done should depend on the child's age and the nature of their past traumas. It may not be appropriate to physically comfort a 13-year-old boy or a 15-year-old girl in a therapeutic session, a safe physical experience can be provided by means of formal massages or a bubble bath. It is very important to realise that the past cannot be undone by providing experiences that would have been appropriate by the right person at an earlier age, but which, if provided by a therapist later in the patient's life, would work regressively, set up expectations of compensation for past harm, induce helplessness and precipitate flashbacks. It is critical that the positive physical experiences are age-appropriate.

After learning to tolerate trauma-related sensations and emotions, the child needs to be encouraged to move through the experience, in words or physical play.

The therapeutic relationship

Because many of these children have no prior experiences with secure attachments, it is critical to

provide the child with a caregiver who is committed to staying and attending to the child's needs, regardless of his or her behaviour. Only when the child has such a consistent and predictable caregiver can he or she learn to regulate and modify his or her internal states and develop a sense of interpersonal security. Providing such a consistent relationship can be very difficult, because habitual patterns of avoidance or superficial accommodation, as well as re-enactments of abuse, greatly taxes the caregiver's patience. Not having learned to trust, these children show discrepancies between what they say, their behaviour, and their emotional expressions. They may show physical evidence of panic, but claim that they are fine. Often, they appear genuinely unable to connect their physical reactions and their emotions [120]. The therapeutic relationship must provide the security to develop the capacity for being open to new experiences and to develop self-understanding. Being able to name and tolerate sensations, feelings and experiences gives people the capacity to 'own' what they feel. The task of the therapist is to help them get in touch with either their feelings (in avoidant children), or their thoughts (in ambivalent children). Being 'in touch' with oneself is indispensable for mastery and for having the mental flexibility to contrast and compare, and to imagine a range alternative outcomes (aside from a recurrence of the trauma).

Learning to play and use language

At the centre of the therapeutic endeavour with terrified children is helping them understand that they are repeating their early experiences, helping them find new repertoires by learning to make connections between their experience, their emotions and reactions [79,80]. Unfortunately, all too often, medications take the place of teaching children skills to deal with their uncomfortable physical sensations. In order to 'process' their traumatic experiences these children first need to develop a play space, an 'as if space', in which they can 'look at' the trauma without making it real.

Transitional spaces for fantasy and creative thinking [99,121] can only develop if there is a person who interposes him or herself between outer and inner reality, helping the child to develop alternative realities besides the horrible realities of the trauma. Developmental games such as peek-a-boo, or hide-and-seek, help the child to playfully gain experience with absence and to internalise people who may not be available at the moment [122]. These play experiences

serve as forerunners for developing inner safe spaces for fantasy and associations. These developmental games are important because only after they have been successfully mastered is the child able to play out traumatic experiences without the risk that the experiences will become real [112]. If that happens, playing out the trauma would turn into a retraumatization [97]. However, processing the trauma is essential. As long as they are unable to talk about their traumatic experiences they simply have no story. Instead the trauma will be expressed as an embodiment of what happened: the body will tell the story: with striated muscles (in action) or smooth muscles (as psychosomatic problems). The task of therapy is to help these children develop words in order for them to be seen and understood, both by others and by themselves.

Dealing with learning problems

Traumatized children suffer from a variety of learning disabilities [114]. In order to be fully functional these children need to learn how to succeed in learning. Otherwise their early trauma and abuse will continue in the form of further assaults on their self-esteem and productivity, causing the trauma to be expressed in their overall decreased capacity to fully contribute to their place in society. Special training programs need to address attention problems, dyslexia and problems with mathematics, in an developmentally appropriate fashion [15].

Conclusion

Child abuse and neglect is responsible for costly long-term psychiatric disabilities, chronic medical problems, drug and substance abuse, learning problems, unemployment, risk of developing HIV and other serious social and health problems. Children with these experiences demonstrate reactions in their affective, cognitive and neurobiological development. Early comprehensive intervention may effectively reverse some of these changes. If not prevented, or treated early, these children are likely to grow up to lead traumatized and traumatizing lives. Their problems with affect modulation are likely to lead to impulsive behaviour, drug abuse and interpersonal violence. Their learning problems interfere with their becoming productive members of society. Early intervention is of critical importance, because, once they drop out beyond ordinary social safety nets, they make their presence known as individuals who pay a

very high price for their (mis)behaviour. Providing these maltreated children with care, sustenance and specialised therapeutic interventions has been shown to considerably lessen the long-term risk they pose to themselves and to society at large [123].

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